

# Performing Maxillofacial Surgeries during Covid19: Current Challenges and Possible Solutions

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**Abstract**— *The world is witnessing an invasion from a new corona virus, which resulted in more than one million of deaths. Most of the sectors such industrial, economy, and tourism are facing a crisis, hence the workers in the field of medicine, considered to be the barrier to fight this invasion. This new virus seems to have two main transmission routes: direct and contact, which it will open a high chance of infection among professional health providers, especially, surgeons and dentists. Maxillofacial and dental surgeons, considered to be essential professional health experts that perform, multiple surgeries and dental procedures every day, consequently, these professions will exhibit a high risk of getting infected by Covid19, due to that, this review article aimed to discuss the possible ways that it may help in optimizing the level of infection control.*

**Keywords**— *Covid 19, corona virus, Maxillofacial Surgeries, health providers, dental surgeons.*

## I. INTRODUCTION

Wuhan witnessed unidentified disease which characterized by multiple symptoms such as tiredness, pneumonia, lack of appetite, and vomiting.<sup>1,2</sup> Then in the following months this new diseases spread to Europe, Middle east, and most of the part of world, which led the World Health Organization to declare a pandemic alert in march 2020.<sup>3</sup>

Covid-19 considered to be the name for this disease, which is originally caused by a Severe Air Respiratory Syndrome (SARS) Coronavirus 2 (SARS-CoV-2).<sup>4</sup> According to both genetic and epidemiological research, the diseases begin its the invasion from animal to human, then subsequent to start from human to human.<sup>4,5</sup>

According to world-meter website, there are more than one million death until 21 November 2020. Hence, multiple health organizations and authorities around the world such as, Center for Disease Control and Prevention have instruct the dentists and their teams to give a regulation for their services to provide them with guidance which will enable them to obtain protection for their patients from this infection.<sup>6</sup>

Performing dental and maxillofacial surgeries may put the dentist and his/her team in a high risk of transmission to Covid19, as they may deal with Asymptomatic (carrier) patients as well as patients with an acute respiratory illness may present for dental treatment at outpatient dental settings.<sup>1,6,7</sup> Hence, in this review article, we focused in the challenges, precautions and solutions, that the dental and maxillofacial surgeon should be aware of to decrease the chances of the transmission of this pandemic disease.

## II. SYMPTOMS

Patients which have COVID-19 will show multiple clinical symptoms such fever, dry cough, and myalgia.<sup>8</sup> But there are other clinical symptoms have been recorded:

1. Dyspnoea.<sup>8,9</sup>
2. Fatigue.<sup>10</sup>
3. Headache.<sup>11</sup>
4. Nausea/vomiting.<sup>12</sup>
5. Sore throat.<sup>13</sup>
6. Rhinorrhoea.<sup>14</sup>
7. Patchy shadows and ground glass opacity in the lung, which is revealed by chest CT.<sup>15</sup>
8. Hemoptysis.<sup>1</sup>
9. Shortness of breath.<sup>16-18</sup>

Despite that the COVID-19 initially has been divided into four types: mild, moderate, severe, and critical cases, there is increasing evidence that multiple infections of COVID-19 are asymptomatic, but they can transmit the virus to others.<sup>19</sup>

### **III. PATHOGENESIS**

In the same way of its previous family member SARS-CoV, this new virus attack the cells by utilize angiotensin-converting enzyme 2 (ACE2) as its receptor, because ACE2-mediated angiotensin II (Ang II) degradation plays a vital role in the pathogenesis of severe lung failure after a viral infection, the seriousness of the virus infection is correlated to the level of maturation and binding capacity of ACE2.<sup>19,20</sup>

### **IV. ROUTES OF TRANSMISSION**

The main routes of transmission of Sars-Cov2 are two routes:

1. The first route include the transmission through a direct pathway. That's happen when the infected person goes sneezing or coughing near the non-infected person.<sup>21</sup>
2. The second route include the transmission through contact with oral, nasal, and eye mucous membranes.<sup>21,22</sup>

Despite that the common clinical manifestations of this virus do not contain symptoms that it relates to eye, the analysis of conjunctival samples from confirmed and suspected cases of Covid-19 suggests that the transmission of this virus is not restricted to the respiratory tract, and that eye exposure may provide an effective way for the virus to enter the body.<sup>21,23</sup>

### **V. IMPACT OF COVID-19 ON ORAL AND MAXILLOFACIAL SURGERIES**

The pandemic of COVID-19 has affected all aspects of life including all economic activity, travel, governance, and education, dentistry and oral surgery are also not spared.<sup>24,25</sup>

Balaji SM<sup>24</sup> stated that Oral and maxillofacial surgeons need to revisit their infection control protocols before fulfilling their professional and moral obligation. Before encouraging treatment, globally advocated COVID-19 sterilization and disinfection protocol need to be followed.

It recommended that all avoidable and non-emergency procedures can be postponed, until COVID-19 is contained. Some surgeries can be performed such as surgeries that demands

airway management, stopping bleeding, surgeries of patients who need drainage of infections that is resistant to antibiotics, and on co-surgeries where a delay in performing the surgery will impact the survival period. If the procedure requires immediate treatment, it would be safer to assume them to be COVID-19 positive till proven otherwise and use appropriate guidelines.<sup>24</sup>

## VI. PATIENT EVALUATION

Pre-check triage should be formed to classify the patient status in relation to covid-19<sup>1</sup>. The patient evaluation contained some steps:

1. The triage starts by calling the patient to make an appointment or to register their elective hospital admission. From the Oral and Maxillofacial Surgery Department, through a simple checking-questionnaire, patients must be identified as having a high risk of infection and, consequently, adopt protective measures.<sup>26</sup>
2. The presence of these symptoms should be investigated temperature of the patient showed an increase above 37.5 °C, or any type of previous mentioned symptoms, Forehead thermometer (for no contact) is highly recommended for the screening procedure.<sup>26</sup>
3. If a patient stated that he/she has been to an area that showed a history of positive COVID-19 cases within the past 14 days, quarantine for at least 14 days is suggested. In areas where COVID-19 spreads, nonemergency dental practices should be postponed.<sup>1</sup>
4. Before the procedure of evaluating the patient inside the clinic, operating room or hospitalization area, it is essential to clearly explain to him/her which procedures are prioritized and which are preferably avoidable.<sup>26</sup>

## VII. ORAL AND MAXILLOFACIAL SURGEON PROTECTION

### 7.1 Health care personal exposure risk:

The nature of work of maxillofacial surgeons make them work in the area of head and neck, same as other surgeons such plastic surgeries, in addition to the their ancillary staff, this will put them in a high risk of exposure to covid-19.<sup>27-30</sup>

Chigurupati R et al.<sup>27</sup> stated that there some considerations in "How to Protect Healthcare Personnel". These considerations include:

1. Execute source control-facemasks for everyone entering a healthcare centers such as, health care personal, patients, visitors), regardless of symptoms.
2. Actively screening everyone for fever and symptoms of COVID-19.
3. Create barriers to terminate the contact with patients at triage.
4. Control the numbers of staff performing patient care.
5. Assure hand hygiene.
6. Follow standard and transmission-based precautions.

7. Use proper personal protective equipment, including (powered air-purifying respirator or surgical respirator masks, face shield, eye protection, fluid-resistant gowns, booties) for aerosol-generating procedures.
8. Understand sequence of donning and doffing of personal protective equipment and mask fitting.

## 7.2 Personal Protective Equipment:

The epidemic of **human immunodeficiency virus** in the previous year's such as 1980s giving a new concept to understand the "Universal Precautions", that go to a suggestion that all patients were an infection risk, and care should be taken.<sup>27</sup> Monje Gil et al.<sup>26</sup>, described the personal protective equipment for healthcare professionals and workers, which is modulated by World Health Organization European Centre for Disease Prevention and Control:

1. **Protection in outpatient clinic area:** If the Patients showed no symptoms and negative to COVID-19, the type of personal protective equipment would include surgical mask / filtering facepiece1, and gloves. However, suspected patients who showed a respiratory symptom or confirmed to be positive COVID-19, will have more preparation, as their type of personal protective equipment will include FFP2 mask, coat, gloves, surgical cap, and eye protection (sealed glasses/face mask).
2. **Protection inside the office of oral and dental surgery and hospitalization ward:** If the activity of the patients showed no symptoms and confirmed negative to COVID-19, the type of personal protective equipment will include surgical mask / filtering facepiece1 and gloves. While if there is a direct activity in suspected patients who is showing symptoms or confirmed positive to COVID-19, the type of personal protective equipment will include filtering facepiece2 mask, coat, gloves, surgical cap, and eye protection (sealed glasses/face mask). However, the aerosol-forming operations in a suspected patient who shows symptoms or confirmed COVID-19 positive, will have more protection measure, hence the type of personal protective equipment will includes filtering facepiece3 mask, coat, gloves, disposable surgical cap, eye protection (sealed glasses/face mask), and apron.
3. **Protection in the surgery room:** If the patients showed no symptoms and are negative to COVID-19, the type of personal protective equipment will include filtering facepiece2 mask, sterile surgical gloves, disposable surgical cap, and eye protection (sealed glasses/face mask). The direct activity in suspected patients who showed symptoms or COVID-19 positive will include special preparation, hence the type of personal protective equipment will include filtering facepiece3 mask, waterproof sterile surgical gown, sterile surgical gloves, double disposable surgical cap, and eye protection (sealed glasses/face mask).

As a general rule, before applying any type of operation or accepting patients, a SARS-CoV-2 test should be done. Patients who have an emergency condition or any type of urgent intervention which doing the test will consume much time should be considered as potentially infectious. Since, there are a huge amount of patients that are asymptomatic but in the same time they are Covid-19 positive, Hence its essential initially to considered all of the patient

are Covid-19 positive.<sup>26,30</sup> To make sure the ideal protection of operating room personnel, if a patient confirmed his/her infection with COVID-19 will be going under treatment or any procedure, personal protective equipment must be used together with the usual operating room clothing. The covid-19 seems to contain two major pathways of transmission: direct and contact, the personal protective equipment must perfectly and completely cover the skin, especially the area of the body which exhibit a greater risk such as mouth and nose, taking into consideration that aerosols could be created during different operational procedures in the oro-maxillofacial area.<sup>26</sup>

The glass that is used to provide a protection for the eyes should fit over and around the eyes or personal lenses and be indirectly ventilated to prohibit penetration of splashes or aerosols. The protective screens provide barrier protection for the area of the face and related mucous membranes, as it works as an alternative to protective glasses. In the condition which it may exhibit a superior risk of aerosolization, an approved protective screen should be used. Personal protective equipment will be indispensable in any surgical operation in the field of oral and maxillofacial area and also in other operations room's procedures such as, canalizations, and regional anesthesia. Hence, it's vital to determine which personnel which apply the protection which is suitable for every activity such as the activities in the ambulatory, elective operation, and ward of hospitalization. All of the maxilla-facial surgeons, anesthetists, surgeons' assistants, and scrub-nurses must have all the stuff to guarantee a proper condition of ultimate safety. In all cases, the number of the workers, and staff members inside the surgery room should be minimal.<sup>26,31</sup> The circulating nurse and surgery room assistants will not require superior protection as the surgical-mask could be enough, However filtering face piece 2 mask is always recommended, as they may approach the patient in a risky surgical maneuvers or they may go through operations that may generate aerosols. It's essential that the professional surgical team and assisting staff should have previous supervised professional training in placement and removal personal protective equipment before applying a real operation.<sup>26</sup>

### **7.3 Antiseptic Agents:**

Vergara-Buenaventura et al.<sup>32</sup>, suggested to use pre-operational mouthwashes in dental health services centers and clinics to minimize this new corona viral load to decrease the rate of cross-infection risk while treating patients during the pandemic. The antimicrobial effect of povidone iodine (PVP-I) used in the operations, as it applied to provide a skin preparation for the surgery, since the free iodine has the ability to inactivate proteins, oxidize nucleic acids, and destroy microbes..<sup>27</sup> The effect of its action has been well demonstrated through many in vitro studies against multiple viruses, including SARS-CoV, MERS-CoV, and influenza virus A (H1N1).<sup>32-35</sup> Recent investigations have suggested that 0.23% PVP-I mouthwash for at least 15 seconds before procedures may reduce salivary viral load, indicating its use in COVID-19-positive patients.<sup>32,36,37</sup>

### **7.4 Operating room preparation:**

Using the operation rooms with negative pressure will be an ideal choice to decrease the level of the risk of the infection.<sup>38</sup> But the operation rooms are usually created with positive

pressure air circulation. A superior air exchange cycle rate ( $\geq 25$  cycles/h) help in decrease the load of viruses in the operation rooms.<sup>39</sup>

The number of operation's gears and tools should be kept minimally, only the mandatory tools should be kept. Once the operation begins, all strategies must be done and prepared to use the current equipment that's already inside the operation room and decrease the staff's movement in and out the operation room, in order to decrease the level of risk of infection. Standard anaesthetic trolleys should be substituted with devoted pre-prepared ones with minimal but suitable stock. All demanded surgical tools and materials such as stitches, and blades must be previously prepared in a sterilizable steel-wire basket. Special infection risk health waste containers should be used for sharp disposable instruments that got infected during surgical procedures. To preserve proper hand hygiene, alcoholic solution should always be there. All surgical team members should enter the surgery room timely to decrease time spent within the operation room itself, hence, they should not go out the surgery room until the operation is completed, and once they left the room, they should not enter again.<sup>38</sup>

### **7.5 Linen management:**

Linen can be exhibit with microbes due to that, it should be handled carefully, and transportation procedure should be done with a high care, in purpose to prevent diffusion of infection. Disposable laundries considered to be much more preferable if it's possible. The procedure of handling the laundries and linen should be done with the personal protective equipment and should not put on the floor, but directly to the special containers, then the containers sealed and sent to cleaning and sterilization.<sup>38</sup>

## **VIII. CONCLUSION**

Working and performing the daily routine surgeries seems to be difficult through the period of covid-19. Multiple consideration should be done to create an ideal working environment, hence the surgeons and their team have a lot of new duties, such as re-visiting their infection control protocols, using special personal protective equipment, and prioritizing their surgeries. Consequently, all of that consideration may help in optimizing the level of infection control of the operation room during Covid19 period.

## **REFERENCES**

- [1] Ayyed AB. Dental Practice Infection Control Measurements: Coronavirus Disease (COVID-19) Outbreaks. *Int J Clin Pediatr Dent* 2020;13(3):279–283.
- [2] Pan L, Mu M, Yang P, et al. Clinical Characteristics of COVID-19 Patients With Digestive Symptoms in Hubei, China: A Descriptive, Cross-Sectional, Multicenter Study. *Am J Gastroenterol.* 2020;115(5):766-773.
- [3] Checchi V, Bellini P, Bencivenni D, Consolo U. COVID-19 dentistry-related aspects: a literature overview. *Int Dent J.* 2020 Jul 5;10.1111/idj.12601. doi: 10.1111/idj.12601. Epub ahead of print. PMID: 32623723; PMCID: PMC7361251.
- [4] Lo Giudice R. The Severe Acute Respiratory Syndrome Coronavirus-2 (SARS CoV-2) in Dentistry. Management of Biological Risk in Dental Practice. *Int J Environ Res Public Health.* 2020;17(9):3067.
- [5] Guo Y.-R., Cao Q.-D., Hong Z.-S., Tan Y.-Y., Chen S.-D., Jin H.-J., Tan K.-S., Wang D.-Y., Yan Y. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak—An update on the status. *Mil. Med. Res.* 2020;7:1–10.
- [6] Odeh ND, Babkair H, Abu-Hammad S, Borzangy S, Abu-Hammad A, Abu-Hammad O. COVID-19: Present and Future Challenges for Dental Practice. *Int J Environ Res Public Health.* 2020;17(9):3151.

- [7] Li Y, Ren B, Peng X, et al. Saliva is a non-negligible factor in the spread of COVID-19. *Mol Oral Microbiol.* 2020;35(4):141-145.
- [8] Ather A, Patel B, Ruparel NB, Diogenes A, Hargreaves KM. Coronavirus Disease 19 (COVID-19): Implications for Clinical Dental Care. *J Endod.* 2020;46(5):584-595. doi:10.1016/j.joen.2020.03.008
- [9] Sharma R, Agarwal M, Gupta M, Somendra S, Saxena SK. Clinical Characteristics and Differential Clinical Diagnosis of Novel Coronavirus Disease 2019 (COVID-19). *Coronavirus Disease 2019 (COVID-19).* 2020;55-70. Published 2020 Apr 30. doi:10.1007/978-981-15-4814-7\_6
- [10] Li J, Chen Z, Nie Y, Ma Y, Guo Q, Dai X. Identification of Symptoms Prognostic of COVID-19 Severity: Multivariate Data Analysis of a Case Series in Henan Province. *J Med Internet Res.* 2020;22(6):e19636. Published 2020 Jun 30. doi:10.2196/19636
- [11] Uygun Ö, Ertaş M, Ekizoğlu E, et al. Headache characteristics in COVID-19 pandemic-a survey study. *J Headache Pain.* 2020;21(1):121. Published 2020 Oct 13.
- [12] Andrews PLR, Cai W, Rudd JA, Sanger GJ. COVID-19, nausea, and vomiting [published online ahead of print, 2020 Sep 21]. *J Gastroenterol Hepatol.* 2020;10.1111/jgh.15261.
- [13] Zhang T, Liu D, Tian D, Xia L. The roles of nausea and vomiting in COVID-19: did we miss something? [published online ahead of print, 2020 Oct 17]. *J Microbiol Immunol Infect.* 2020;doi:10.1016/j.jmii.2020.10.005
- [14] Lovato A, de Filippis C. Clinical Presentation of COVID-19: A Systematic Review Focusing on Upper Airway Symptoms. *Ear Nose Throat J.* 2020 Nov;99(9):569-576. doi: 10.1177/0145561320920762. Epub 2020 Apr 13. PMID: 32283980.
- [15] Jamal M, Shah M, Almarzooqi SH, et al. Overview of transnational recommendations for COVID-19 transmission control in dental care settings [published online ahead of print, 2020 May 19]. *Oral Dis.* 2020;10.
- [16] Nie S, Han S, Ouyang H, Zhang Z. Coronavirus Disease 2019-related dyspnea cases difficult to interpret using chest computed tomography. *Respir Med.* 2020;167:105951. doi:10.1016/j.rmed.2020.105951
- [17] AlSamman M, Caggiula A, Ganguli S, Misak M, Pourmand A. Non-respiratory presentations of COVID-19, a clinical review [published online ahead of print, 2020 Sep 24]. *Am J Emerg Med.* 2020;S0735-6757(20)30847-0. doi:10.1016/j.ajem.2020.09.054
- [18] Oleynick C. Symptoms of Pleurisy as the Initial Presentation of COVID-19. *Am J Case Rep.* 2020;21:e925775. Published 2020 Jul 24. doi:10.12659/AJCR.925775
- [19] Gao Z, Xu Y, Sun C, et al. A Systematic Review of Asymptomatic Infections with COVID-19 [published online ahead of print, 2020 May 15]. *J Microbiol Immunol Infect.* 2020;10.1016/j.jmii.2020.05.001. doi:10.1016/j.jmii.2020.05.001
- [20] Kai H., Kai M. Interactions of coronaviruses with ACE2, angiotensin II, and RAS inhibitors-lessons from available evidence and insights into COVID-19. *Hypertens Res.* 2020 Apr 27 doi: 10.1038/s41440-020-0455-8. PMID: 32341442.
- [21] Peng X, Xu X, Li Y, et al. Transmission routes of 2019-nCoV and controls in dental practice. *Int J Oral Sci* 2020;12(1):9. DOI: 10.1038/s41368-020-0075-9
- [22] Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. *Lancet.* 2020 Feb 22;395(10224):e39. doi: 10.1016/S0140-6736(20)30313-5. Epub 2020 Feb 6. PMID: 32035510; PMCID: PMC7133551.
- [23] To KK, Tsang OT, Yip CC, Chan KH, Wu TC, Chan JM, Leung WS, Chik TS, Choi CY, Kandamby DH, Lung DC, Tam AR, Poon RW, Fung AY, Hung IF, Cheng VC, Chan JF, Yuen KY. Consistent Detection of 2019 Novel Coronavirus in Saliva. *Clin Infect Dis.* 2020 Jul 28;71(15):841-843. doi: 10.1093/cid/ciaa149. PMID: 32047895; PMCID: PMC7108139.
- [24] Balaji SM. COVID-19 and Maxillofacial Surgery. *Ann Maxillofac Surg.* 2020;10(1):1-2.
- [25] Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): Emerging and future challenges for dental and oral medicine. *J Dent Res.* 2020;99:481-7.
- [26] Monje Gil, Florencio, CebriánCarretero, José Luis, López-CedrúnCembranos, José Luis, et al. Management of patients in oral and maxillofacial surgery during the stage of crisis and subsequent control of COVID-19 pandemic. *Revista Española de Cirugía Oral y Maxilofacial.*2020;42(2),51-59.
- [27] Chigurupati R, Panchal N, Henry AM, et al. Considerations for Oral and Maxillofacial Surgeons in COVID-19 Era: Can We Sustain the Solutions to Keep Our Patients and Healthcare Personnel Safe?. *J Oral Maxillofac Surg.* 2020;78(8):1241-1256. doi:10.1016/j.joms.2020.05.027.
- [28] Vukkadala N., Qian Z.J., Holsinger F.C. COVID-19 and the otolaryngologist: Preliminary evidence-based review. <https://doi.org/10.1002/lary.28672> [e-pub ahead of print]. *Laryngoscope.* accessed April 27, 2020.

- [29] Xu K., Lai X.Q., Liu Z. [Suggestions for prevention of 2019 novel coronavirus infection in otolaryngology head and neck surgery medical staff] *Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi*. 2020;55:E001.
- [30] Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *N Engl J Med*. 2020;382(10):970-1.
- [31] Balibrea JM, Badia JM, Rubio Pérez I, Martín Antona E, Álvarez Peña E, García Botella S, et al. Surgical management of patients With COVID-19 infection. Recommendations of the Spanish Association of Surgeons. *Cir Esp*. 2020. pii: S0009-739X(20)30069-5.
- [32] Vergara-Buenaventura A, Castro-Ruiz C. Use of mouthwashes against COVID-19 in dentistry. *Br J Oral Maxillofac Surg*. 2020;58(8):924-927. doi:10.1016/j.bjoms.2020.08.016
- [33] Parhar H.S., Tasche K., Brody R.M. Topical preparations to reduce SARS-CoV-2 aerosolization in head and neck mucosal surgery. *Head Neck*. 2020;42:1268–1272.
- [34] Kariwa H., Fujii N., Takashima I. Inactivation of SARS coronavirus by means of povidone-iodine, physical conditions and chemical reagents. *Dermatology*. 2006;212(Suppl. 1):119–123.
- [35] Eggers M., Koburger-Janssen T., Eickmann M. In vitro bactericidal and virucidal efficacy of povidone-iodine gargle/mouthwash against respiratory and oral tract pathogens. *Infect Dis Ther*. 2018;7:249–259.
- [36] Mady L.J., Kubik M.W., Baddour K. Consideration of povidone-iodine as a public health intervention for COVID-19: utilization as “Personal Protective Equipment” for frontline providers exposed in high-risk head and neck and skull base oncology care. *Oral Oncol*. 2020;105:104724
- [37] Challacombe S.J., Kirk-Bayley J., Sunkaraneni V.S. Povidone iodine. *Br Dent J*. 2020;228:656–657
- [38] Coccolini F, Perrone G, Chiarugi M, et al. Surgery in COVID-19 patients: operational directives. *World J Emerg Surg*. 2020;15(1):25. Published 2020 Apr 7. doi:10.1186/s13017-020-00307-2
- [39] Wong J, Goh QY, Tan Z, Lie SA, Tay YC, Ng SY, Soh CR. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. *Can J Anaesth*. 2020; [Epub ahead of print]. infectious-risk health waste.